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THE ETHANOL HEAVY TRUCK FLEET DEMONSTRATION PROGRAM

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ABOUT THE PROGRAM:

Recognizing the need to improve air quality in our cities, the State of Illinois has become a leader in the testing of ethanol as a viable alternative transportation fuel. In October 1988, the President signed the Alternative Motor Fuel Act of 1988 (AMFA), the purpose of which is to encourage the use and production of alternative fuel light-duty vehicles, urban transit buses and heavy-duty trucks. Also, in 1990, the Clean Air Act (CAA) was signed into law imposing new emissions standards for transportation vehicles. In response to these Acts, the State of Illinois, in cooperation with the U. S. Department of Energy, has developed a test and demonstration program involving the nation's first ethanol-fueled heavy-duty, over the road truck fleet to meet the 1994 emission standards. The fleet is made up of four ethanol trucks which are owned and operated by Archer Daniels Midland of Decatur. In addition, ADM is operating one conventional diesel, identical to the other trucks, as a control vehicle for the study. The trucks will initially be driven only on short runs, returning to Decatur every night. Eventually, however, they will be used for interstate driving to Iowa and Missouri, and will be refueled at ADM terminals in those states. The heavy trucks are expected to receive high hours of usage and high mileage--it is estimated that they will be driven up to 150,000 miles per year, mostly over interstate highways. This amount of use will provide valuable information on the performance and reliability of ethanol engines in commercial fleets.

THE VEHICLES:

The trucks being used for this demonstration are 1992 White-GMC model WIM64T dual-tandem tractors. They contain Detroit Diesel Corporation 6V-92 engines designed to run on ethanol fuel. The 6V-92 is a vee-configuration, 6 cylinder engine rated at 300 horsepower. They are "dedicated" engines, which means they can only run on E-95 fuel. E-95 is composed of 95% anhydrous ethanol with a 5% denaturant required by law. (This is the same ethanol blended 10% with unleaded gasoline.) The trucks also contain several specialized features not found in a conventional diesel engine. These

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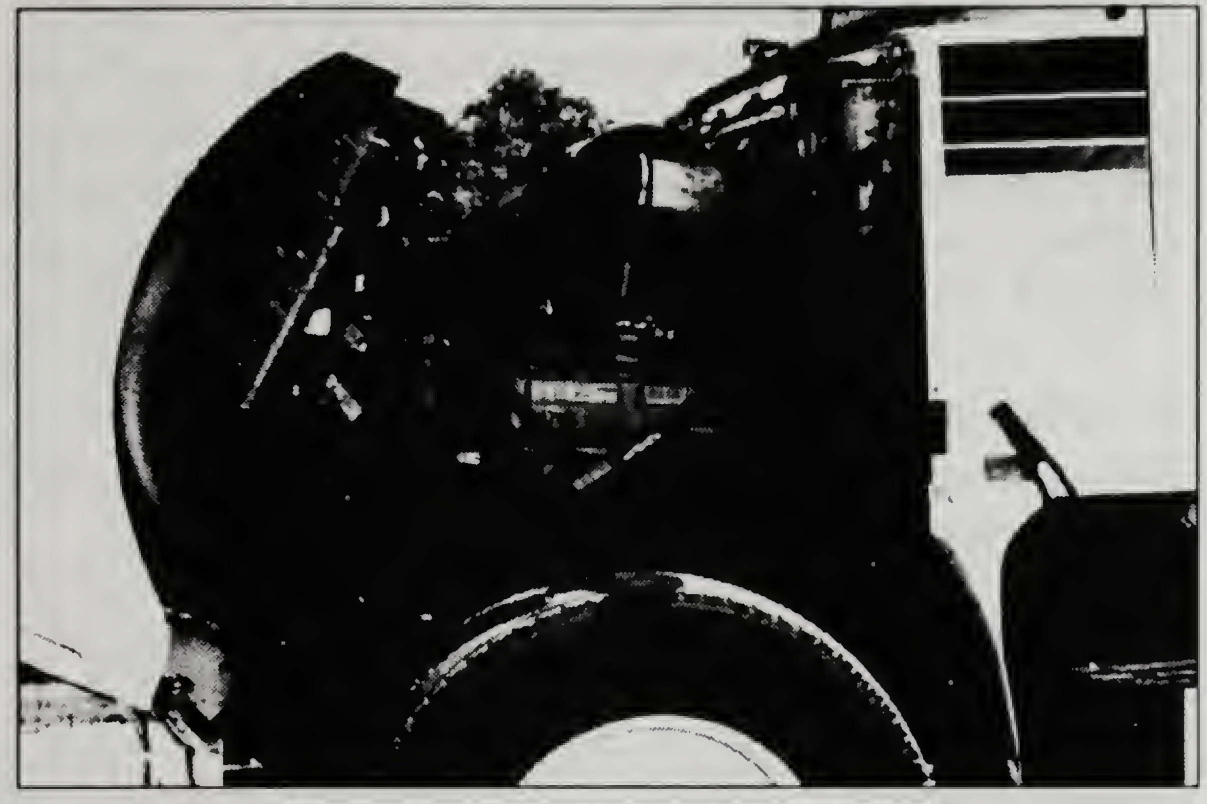

• 6V-92 TA ETHANOL ENGINE EMISSIONS •

Grams/Brake Horsepower-Hour

	Particulates	Hydrocarbons	Carbon Monoxide	Oxides of Nitrogen (NO_X)
1994 EPA Heavy Duty Engine Standard	0.10	1.30	15.50	5.00
6V-92 E95 Engine (After 150,000 Miles)	0.03 0.04	0.20 0.27	0.20 0.76	3.10 3.70
1991 6V-92TA Diesel Engine (#2 Diesel)	0.25	0.50	1.30	4.60

* * *

include an advanced electronic control system, modified fuel injectors, redesigned glow plugs (to enhance engine start-up), and a catalytic converter.

VEHICLE TESTING PROGRAM:

One of the primary purposes of this project is to evaluate ethanol's role in meeting the emissions standards of the Clean Air Act. Under the Clean Air Act, new regulations, effective in 1994, have been established for emissions from heavy-duty truck engines. Laboratory emissions tests, performed by Detroit Diesel Corporation, on the DDC 6V-92 ethanol engines show results that are lower than the levels required by the 1994 regulations. Through this project, it is hoped that emission levels measured from heavy truck engines operating under normal conditions will confirm the laboratory results.

The ADM trucks will undergo extensive testing throughout the three-year period. A transportable emissions testing laboratory from the University of West Virginia will be used to measure the total hydrocarbons, nitrogen oxides (NOx), carbon dioxide (CO2), carbon monoxide (CO), and aldehydes emitted by the trucks. In addition, a DDEC II electronic monitoring system will be plugged into the computer of the truck to provide a computerized readout of the total hours driven and miles per gallon. Drivers of the trucks will also be asked to report about the trucks' driveability, reliability, performance, and any problems they may experience with the vehicles. Finally, at the end of the program, the Detroit Diesel Corporation will perform a complete engine teardown and wear analysis of the truck engine to further evaluate the effects of ethanol as a motor fuel.

ETHANOL FUEL:

The United States currently imports about 50% of the petroleum we use for fuel every day. Ethanol is a clean burning, renewable American fuel made from of corn. Corn is a crop grown in abundance in the Midwest--Illinois alone harvests over 1.3 billion bushels each year. Each bushel of corn produces about 2.5 gallons of ethanol, but only the starch from the corn is used to make the ethanol, leaving a high protein livestock feed and other valuable co-products. In addition to ethanol, a bushel of corn yields 1.5 pounds of corn oil, 12.4 pounds of 21% protein feed, 3 pounds of 60% gluten meal, and 17 pounds of carbon dioxide (used for carbonating beverages). Illinois produces about 500 million gallons of ethanol annually, more than any other state in the nation; therefore, it makes sense for us to use our own "homegrown" fuel.

BENEFITS OF ETHANOL TO ILLINOIS:

ENVIRONMENTAL

Unlike the fossil fuels it is replacing, ethanol does not add carbon to the atmosphere, and so does not contribute to the greenhouse effect. Growing corn uses carbon dioxide (CO2) from the atmosphere for photosynthesis and emits oxygen to the atmosphere. Using corn-derived ethanol as a transportation fuel, then, simply recycles the carbon dioxide back into the atmosphere where it started. Furthermore, ethanol is an oxygenate--an octane enhancer which contains oxygen. The extra oxygen present adds to the overall oxygen content of the fuel, causing gasoline blended with 10% ethanol to burn cleaner and emit an average of 20% less carbon monoxide (CO) than does unblended gasoline.

ECONOMIC

The ethanol industry currently has over $1 billion in capital invested in Illinois and provides over 800 industry jobs as well as 4,000 additional jobs in industry related services throughout the state. It has been estimated that 2,200 jobs are created for each 100 million bushes of corn used to produce ethanol. Illinois farmers also benefit from the ethanol industry because it serves as a market for surplus corn and helps support grain prices.

Illinois uses more ethanol to substitute for gasoline than any other state in the nation. Consumer acceptance of gasoline blended with 10% ethanol is steadily growing, and over 30% of all gasoline currently sold in Illinois contains 10% ethanol.

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In addition to the heavy-duty ethanol truck fleet, Illinois is also sponsoring demonstrations of ethanol-fueled mass transit buses in Peoria and a fleet of 12 ethanol-fueled cars operating in Chicago and Springfield. Other projects are also being planned, all of which will help to evaluate the role of ethanol as a viable alternative transportation fuel for the future.

In testing these ethanol vehicles, Illinois is taking a strong stand in support of a cleaner environment and promoting domestic sources of energy.

SPONSORS:

- Archer Daniels Midland
- Illinois Department of Energy & Natural Resources
- Detroit Diesel Corporation
- Illinois Ethanol Industry
- U.S. Department of Energy

FOR MORE INFORMATION ABOUT ETHANOL,
CONTACT THE ILLINOIS DEPARTMENT OF ENERGY AND NATURAL RESOURCES AT
1-800-252-8955 (IN ILLINOIS) OR 217-785-0310 (OUTSIDE ILLINOIS).

FOR TDD CUSTOMERS, DIAL 1-800-526-0844 (ILLINOIS RELAY CENTER) OR (217) 785-0211.

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